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GENERAL REVIEW

# Oncological safety of nipple-sparing prophylactic mastectomy: A review of the literature on 3716 cases

## *Sécurité oncologique de la mastectomie prophylactique conservant la plaque aréolomamelonnaire : revue de la littérature à propos de 3716 cas*

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**KEYWORDS**
Nipple-sparing mastectomy;
Prophylactic;
Oncological risk;
Local recurrence

**Summary**
*Introduction.* — The objective of our study was to evaluate the risk of cancer after prophylactic nipple-sparing mastectomy (PNSM).
*Material and methods.* — The PubMed database was consulted using the following key-words: ''nipple-sparing mastectomy'', ''prophylactic'', ''locoregional recurrence'', ''oncological risk''. Articles published between January 1995 and December 2016 were searched.
*Results.* — Out of the 270 articles found, 19 were included. Overall, 15 studies were retrospective, 2 prospective, 2 prospective and retrospective and 3 were multicentric. All told, they involved 3890 patients corresponding to 6786 mastectomies, among which the total number of prophylactic nipple-sparing mastectomies was 3716. Average age of the patients was 44.4 years and average follow-up was 38.4 months (8—168 months); 29.4% of them had a *BRCA 1* or *2* mutation; 85 and 15% underwent prosthetic and autologous reconstructions, respectively. Average cancer rates exterior to and within the nipple areolar complex (NAC) were 0.2 and 0.004%, respectively. The overall average rate of histological pre-malignant lesions in the nipple areolar complex was 1.5%. The overall complication rate was 20.5%, and necrosis rates of the nipple areolar complex and the skin were 8.1 and 7.1%, respectively.

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*Conclusion.* — In prophylactic breast surgery, conservation of the nipple areolar complex does not seem to increase the risk of cancer development. However, short follow-up time and the different methodologies applied in the different studies presently preclude generalization of the technique.


**MOTS CLÉS**
Mastectomie prophylactique avec préservation de la PAM ;
Prophylactique ;
Risque oncologique ;
Récidive locale

**Résumé**
*Introduction.* — L'objectif de cette revue était d'évaluer le risque carcinologique après mastectomie prophylactique conservant la plaque aréolo-mamelonnaire (PAM).
*Matériel et méthodes.* — La base de données PubMed a été utilisée avec les mots clés « nipple sparing mastectomy », « prophylactic », « locoregional recurrence », « oncological risk », de janvier 1995 à décembre 2016.
*Résultats.* — Sur 270 articles retrouvés, 19 ont été inclus. Quinze études étaient rétrospectives, 2 prospectives, 2 prospectives et rétrospectives et 3 multicentriques. Le nombre total de patientes incluses était de 3890, pour lesquelles 6786 mastectomies ont été réalisées dont 3716 mastectomies prophylactiques conservant la PAM. L'âge moyen des patientes était de 44,4 ans ; le suivi moyen de 38,4 mois (8—168 mois) ; 29,4 % des patientes avaient une mutation délétère des gènes *BRCA1 ou 2* ; 85 % des reconstructions étaient prothétiques et 15 % autologues. Les taux moyens de développement d'un cancer à distance de la PAM et sur la PAM étaient respectivement de 0,2 et 0,004 %. Le taux moyen de lésions frontières ou in situ situées sous la PAM était de 1,5 %. Le taux de complications global était de 20,5 %, les taux de nécrose de la PAM et de l'étui cutané étaient respectivement de 8,1 et 7,1 %.
*Conclusion.* — Dans le cadre de la chirurgie prophylactique mammaire, la conservation de la PAM ne semble pas majorer le risque carcinologique. Cependant, le recul faible et la méthodologie des différentes études ne permettent pas de généraliser cette technique.


## Introduction

Patients presenting a high risk of developing mammary tumors connected with either a genetic mutation (*BRCA1* or *BRCA2*, for example) or family history suggesting a genetic predisposition are regularly proposed a specific treatment strategy based on clinical and imagery-based monitoring and/or prophylactic mastectomy. Over recent years, we have witnessed a trend characterized by a steady increase in the number of prophylactic mastectomies [1—3]. Rather recently, Angelina Jolie's highly publicized preventive double mastectomy furthered this phenomenon through what is now called the ''Angelina Jolie effect'' [4]. However, this sociological tendency runs directly counter to an increasingly pronounced breast-conserving emphasis on plastic surgery and senological procedures.

The psychological repercussions of prophylactic mastectomy vary considerably from one woman to another, in certain cases leading to unequally profound perturbations of femininity and sexuality. In fact, breast reconstruction constitutes but one among a number of variably satisfactory responses to the psychological distress experienced by those women ''at high risk of breast cancer'' who have decided on surgical removal of their breasts. That much said, reconstruction fails to eliminate issues of bereavement over the lost breast(s) and appropriation of the reconstructed breast(s) [5], which may nonetheless be facilitated by conservation of the skin covering and the nipple-areolar complex (NAC).

Initially reported in 1962 by Freeman [6], ''subcutaneous'' mastectomy was the first conservative mastectomy (CM) technique, only to give way, in the mid-1990s, to more modern methods. In the United States, a new technique, in which the skin covering is preserved but not the nipple-areolar complex (NAC), skin-sparing mastectomy, was developed [7—9]. As for surgery in which the NAC is also preserved, otherwise known as nipple-sparing mastectomy (NSM), it was presented for the first time in 1999 during a congress at the University of Texas Southwestern Medical School [10]. This technique allows to avoid the secondary reconstruction of the NAC, sometimes associated with a tattoo that can fade over time, requiring iterative recolorations [11].

Generally speaking, conservative mastectomies, particularly NSM, have yielded commendable results and appreciable patient satisfaction [12—15]. However, as these techniques keep mammary tissue in place behind the NAC [16], fears have been voiced concerning NSM's oncological safety, especially insofar as this tissue could possibly be a source of loco-regional recurrence following curative Therapeutic Nipple-Sparing Mastectomy (TNSM) or of cancer occurrence subsequent to Prophylactic Nipple-Sparing Mastectomy (PNSM).

From a curative standpoint, when patient selection criteria are properly observed and when complementary treatments (radiotherapy, chemotherapy, hormonal therapy and targeted treatments) are appropriately applied, TNSM does not seem to entail any supplementary risk, as is shown in the large-scale literature review carried out by Headon et al. [17], who reported a locoregional recurrence risk of 2.38% after 38 months (7.4—156 months) of follow-up.

From a prophylactic standpoint, few studies have been dedicated to PNSM and the oncological risks it may present, even though foreknowledge of the latter is of paramount importance, given that it is rather routinely proposed,

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